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Product Specification of 50HD-PDP Module

CUSTOMER APPROVAL SPECIFICATION

( ) Preliminary Specification
(◎) Final Specification

Title	PM50H1000 (50″HD MODULE)

Buyer Name	Changhong
Model Name	PM50H1000
PART No.	

Supplier	COC Display Devices Co., Ltd.
Model Name	PM50H1000
PART No.	

Signature / Date	
Approved by	
Please return 1 copy for our confirmation with your signature	

Signature / Date	
Approved by	
COC PDP Co., Ltd.	

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Record of Revisions

Revision No.	Effective Date	Comments
0.0	2009. 02. 10.	- Establishment

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0. Warnings and Cautions

WARNING indicates hazards that may lead to death or injury if ignored.

CAUTION indicates hazards that may lead to injury or damage to property if ignored.

1) This product uses a high voltage (450 V max.). Do not touch the circuitry of this product with your hands when power is supplied to the product or immediately after turning off the power. Be sure to confirm that the voltage is dropped to a sufficiently low level.
2) Do not supply a voltage higher than that specified to this product. This may damage the product and may cause a fire.
3) Do not use this product in locations where the humidity is extremely high, where it may be splashed with water, or where flammable materials surround it. Do not install or use the product in a location that does no satisfy the specified environmental conditions. This may damage the product and may cause a fire.
4) If a foreign substance (such as water, metal, or liquid) gets inside the product, immediately turn off the power. Continuing to use the products it may cause fire or electric shock.
5) If the product emits smoke, an abnormal smell, or makes an abnormal sound, immediately turn off the power. If noting is displayed or if the display goes out during use, immediately turn off the power. Continuing to use the product as it is may cause fire or electric shock.
6) Do not disconnect or connect the connector while power to the product is on. It takes some time for the voltage to drop to a sufficiently low level after the power has been turned off. Confirm that the voltage has dropped to a safe level before disconnecting or connecting the connector. Otherwise, this may cause fire, electric shock, or malfunction.
7) Do not pull out or insert the power cable from/to an outlet with wet hands. It may cause electric shock.
8) Do not damage or modify the power cable. It may cause fire or electric shock.
9) If the power cable is damaged, or if the connector is loose, do not use the product; otherwise, this can lead to fire or electric shock.
10) If the power connector or the connector of the power cable becomes dirty or dusty, wipe it with a dry cloth. Otherwise, this can lead to fire.

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! CAUTION

□ General

1) Do not place this product in a location that is subject to heavy vibration, or on an unstable surface such as an inclined surface. The product may fall off or fall over, causing injuries.
2) When moving the product, be sure to turn off the power and disconnect all the cables. While moving the product, watch your step. The product may be dropped or fall, leading to injuries of electric shock.
3) Do not place this product in a location that is subject to heavy vibration, or on an unstable surface such as an inclined surface. The product may fall off or fall over, causing injuries.
4) Before disconnecting cable from the product, be sure to turn off the power. Be sure to hold the connector when disconnecting cables. Pulling a cable with excessive force may cause the core of the cable to be exposed or break the cable, and this can lead to fire or electric shock.
5) This product should be moved by two or more persons. If one person attempts to carry this product alone, he/she may be injured.
6) This product contains glass. The glass may break, causing injuries, if shock, vibration, heat, or distortion is applied to the product.
7) The temperature of the glass surface of the display may rise to 80°C or more depending on the conditions of use. If you touch the glass inadvertently, you may be burned.
8) Do not poke or strike the glass surface of the display with a hard object. The glass may break or be scratched. If the glass breaks, you may be injured.
9) If you glass surface of the display breaks or is scratched, do not touch the broken pieces or the scratches with bare hands. You may be injured.
10) Do not place an object on the glass surface of the display. The glass may break or be scratched.

□ Design

1) This product may be damaged if it is subject to excessive stresses (such as excessive voltage, current, or temperature). The absolute maximum ratings specify the limits of these stresses, and system design must ensure that none of the absolute maximum ratings are exceeded.
2) The recommended operating conditions are conditions in which the normal operation of this product is guaranteed. All the rated values of the electrical specifications are guaranteed within these conditions. Always use the product within the range of the recommended operating conditions. Otherwise, the reliability of the product may be degraded. Use of the product with a combination of parameters, conditions, or logic not specified in the specifications of this product is not guaranteed. If intending to use the product in such a way, be sure to consult COC in advance.

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3) This product emits near infrared rays (800 to 1000nm) that may cause the remote controllers of other electric products to malfunction. To avoid this, use an infrared absorption filter and thoroughly evaluate the system and environment.

4) This product uses high-voltage switching and a high–speed clock. A system using this product should be designed so that it does not affect the other systems, and should be thoroughly evaluated.

5) The materials which contain sulfur are forbidden to use, because they may damage PDP module.

6) This product has a glass display surface. Design your system so that excessive shock and load are not applied to the glass. Exercise care that the vent at the corner of the glass panel is not damaged. If the glass panel or vent is damaged, the product is inoperable.

7) There are some exposed components on the rear panel of this product. Touching these components may cause an electric shock.

8) This product uses a high voltage. Design your system so that any residual voltage in this product is dissipated quickly when power is turned off, observing the specifications.

9) This product uses heat-emitting components. Take the heat emitted by these components into consideration when designing your system. If the product is used outside the specified temperature range, it may malfunction.

10) This product uses a high voltage and, because of its compact design, components are densely mounted on the circuit board. If dust collects on these components, it can cause short-circuiting between the pins of the components and moisture can cause the insulation between the components to break down, causing the product to malfunction.

11) Regulations and standards on safety and electromagnetic interference differ depending on the country. Design your system in compliance with the regulations and standards of the country for which your system is intended.

12) To obtain approval under certain safety standards (such as UL and EN), a filter that passes a shock test must be fitted over the glass surface of the finished product. In addition, it must be confirmed that the level of UV emissions is within the range specified by such standards.

13) If this product is used as a display board to display a static image, “image sticking” occurs. This means that the luminance of areas of the display that remain lit for a long time drops compared with the luminance of areas that are lit for a shorter time, causing uneven luminance across the display. The degree to which this occurs is in proportion to the luminance at which the display is used. To prevent this phenomenon, therefore, avoid static images as much as possible and design your system so that it is used at a low luminance, by reducing signal level difference between bright area and less bright area through signal processing.

14) Within the warranty period, general faults that occur due to defects in components such as ICs will be rectified by COC without charge. However, IMAGE STICKING is not included in the warranty. Repairs due to the other faults may be charged for depending on responsibility for the faults.

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15) In case of AC PDP driving mechanism, because the brightness of output is not always proportional to input signals. Therefore the non-linearity of gray can occasionally be observed in certain gray levels as well as Contour and Error Diffusion Noise can be appeared when a dark picture is on the screen especially. These are phenomena that can be observed on the PDP driving mechanism. With simple adjustment to picture brightness control, these can be reduced considerably.

16) Because of the need to control the power consumption on the PDP driving mechanism, the APL(Average Picture Level) mode was equipped. Thus, as the picture on the screen changes, there can be slightly switched in brightness. This also is a phenomenon that can be observed on the PDP driving mechanism.

17) This product is designed to COC's "Standard" quality grade. If you wish to use the product for applications outside the scope of the "Standard" quality grade, be sure to consult COC in advance to assess the technological feasibility before starting to design your system.

□ Use

1) Because this product uses a high voltage, connecting or disconnecting the connectors while power is supplied to the product may cause malfunctioning. Never connect or disconnect the connectors while the power is on. Immediately after power has been turned off, a residual voltage remains in the product. Be sure to confirm that the voltage has dropped to a sufficiently low level.

2) Watching the display for a long time can tire the eyes. Take a break at appropriate intervals.

3) PDP's brightness and contrast ratio is lower than that of the CRT. The picture is dimmer with surrounding light and better for viewing in dark condition.

4) Do not cover or wrap the product with a cloth or other covering while power is supplied to the product.

5) Before turning on power to the product, check the wiring of the product and confirm that the supply voltage is within the rated voltage range. If the wiring is wrong or if a voltage outside the rated range is applied, the product may malfunction or be damaged.

6) Do not store this product in a location where temperature and humidity are high. This may cause the product to malfunction. Because this product uses a discharge phenomenon, it may take time to light (operation may be delayed) when the product is used after it has been stored for a long time. In this case, it is recommended to light all cells for about 2 hours (aging).

7) If the glass surface of the display becomes dirty, wipe it with a soft cloth moistened with a neutral detergent. Do not use acidic or alkaline liquids, or organic solvents.

8) Do not tilt or turn upside down while the module package is carried, the product may be damaged.

9) This product is made from various materials such as glass, metal, and plastic. When discarding it, be sure to contact a professional waste disposal operator.

□ Repair and Maintenance

Because this product combines the display panel and driver circuits in a single module, it cannot be repaired or maintained at user's office or plant. Arrangements for maintenance and repair will be determined later.

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□ Others

1) If your system requires the user to observe any particular precautions, in addition to the above warnings and cautions, include such caution and warning statements in the manual for your system.

2) If you have any questions concerning design, such as on housing, storage, or operating environment, consult COC in advance.

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1. GENERAL DESCRIPTION

□ DESCRIPTION

The PM50H1000 is a 50-inch 16:9 color plasma display module with resolution of 1365(H) × 768(V) pixels. This is the display device which offers vivid colors with adopting AC plasma technology by COC.

□ FEATURES

High peak brightness (1,800cd/m2 Typical) and high contrast ratio (10,000:1 Typical) enables user to create high performance PDP SETs.

□ APPLICATIONS

- Public information display
- Video conference systems
- Education and training systems

□ ELECTRICAL INTERFACE OF PLASMA DISPLAY

The PM50H1000 requires only 8/10 bits of digital video signals for each RGB color. In addition to the video signals, six different DC voltages are required to operate the display. The PM50H1000 is equipped with P-CUBE function which analyzes display signals to optimize system control factor for showing the best display performance.

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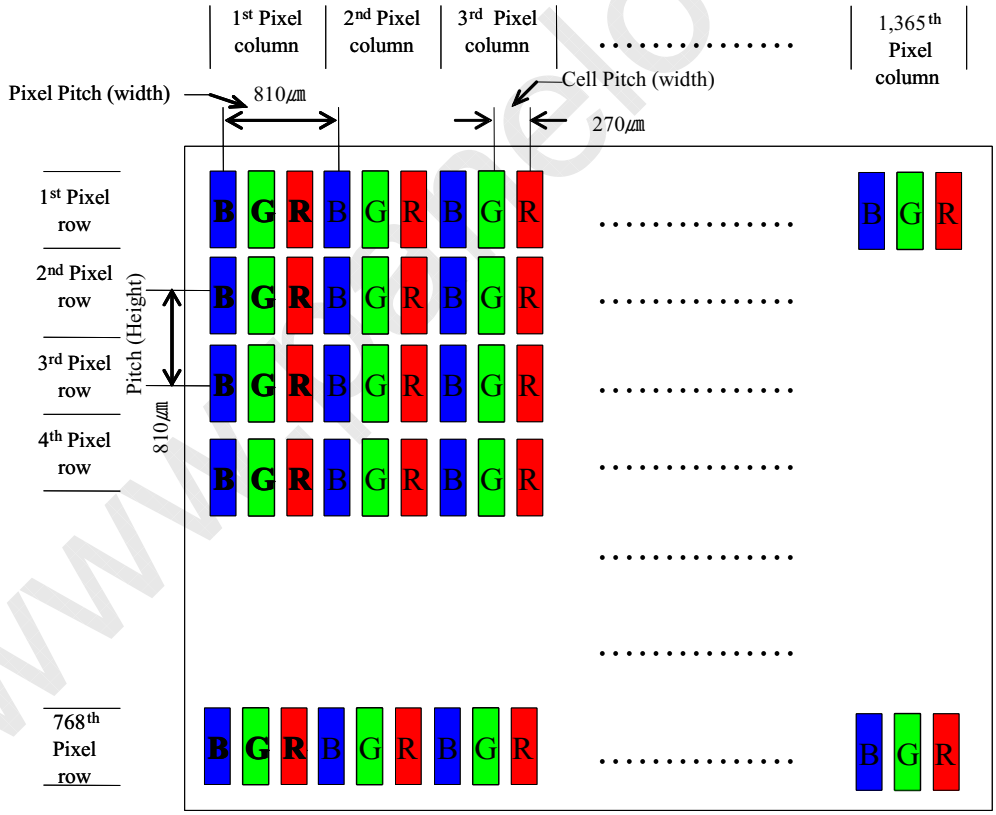
Product Specification of 50HD-PDP Module

□ GENERAL SPECFICATIONS

- Model Name : PM50H1000
- Number of Pixels : 1365(H) × 768(V) (1pixel=3 RGB cells)
- Pixel Pitch : 810㎛ (H) × 810㎛ (V)
- Cell Pitch : 270㎛ (H) × 810㎛ (V)
- Display Area : 1105.6(H) × 622.0 (V) ± 0.5mm
- Outline Dimension : 1180.0(H) × 678.3(V) × 60.8(D) ± 1mm
- Pixel Type : RGB Closed (Well) type
- Number of Gradations : 10bit (R) 1,024 × (G) 1,024 × (B) 1,024 colors (1.073 billion)
  : 8bit (R) 256 × (G) 256 × (B) 256 colors (16.78 million)
- Weight : 18.2-±0.5 Kg (Net 1EA)
- Aspect Ratio : 16:9
- Peak Brightness : Typical 1,800cd/㎡ (1/100 White Window pattern at center)
- Contrast Ratio : Average 180:1 (In a bright room with 100Lux at center)
  : Typical 10,000:1 (In a dark room 1/100 White Window pattern at center)
- Power Consumption : Max. 400W (Full-White)
- Expected Life-time : Warranty life time 60,000 Hours with continuous operation

- Display Dot Diagram



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2. Electrical Specifications

□ Input power Specifications

	Output Name	Output Typical (V)	Variable Voltage Range(V)	Voltage Tolerance (%)	Output Current (A mean)			Ripple & Noise (mVp-p)
					Min.	Nor.	Max.	
*1PDP Module	D5V	5.2	-	±5	1.0	1.5	2.0	120
	Vg	15.5	-	±5	0.1	0.3	0.5	200
	Va	56	54~ 57	±5	0.1	1.6	2.0	500
	Vs	207	200~210	±2	0.1	1.3	1.85	700
Vsc Board (Signal Interface)	5V St-by	5.2	-	±5	0.04	1.0	1.8	120
	A5V	5.2	-	±5	0.1	2.5	4.0	120
	A12V	12	-	±5	0.1	1.0	2.0	200
	Vamp	15.5	-	±5	0.1	0.5	2.5	300
	Vt	32	-	±10	0	0.01	0.015	240

*1. PDP Module Maximum Power is below 450W.

[Note]
1. Earth Leakage current
The power supply leakage current shall be less than 0.5mA

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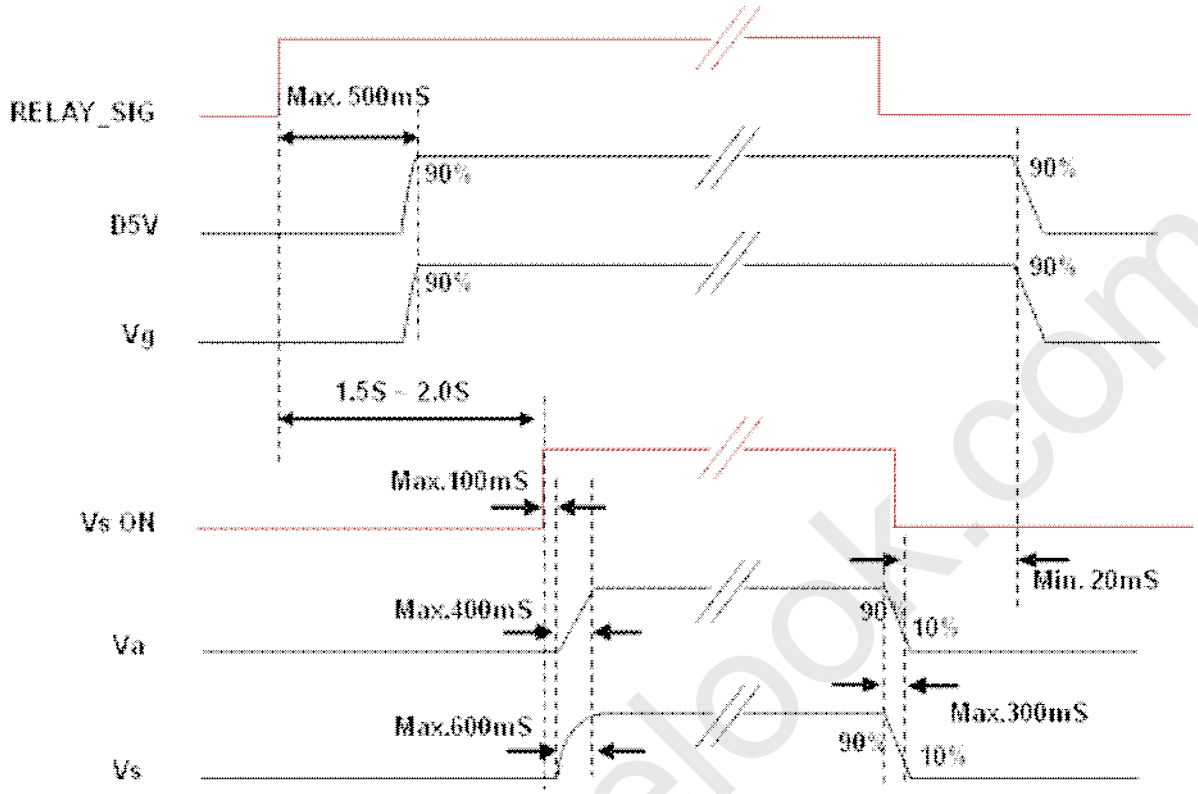
□ Power Sequence



☞ Even when AC input power supply is switched ON/OFF, above sequence should be observed strictly

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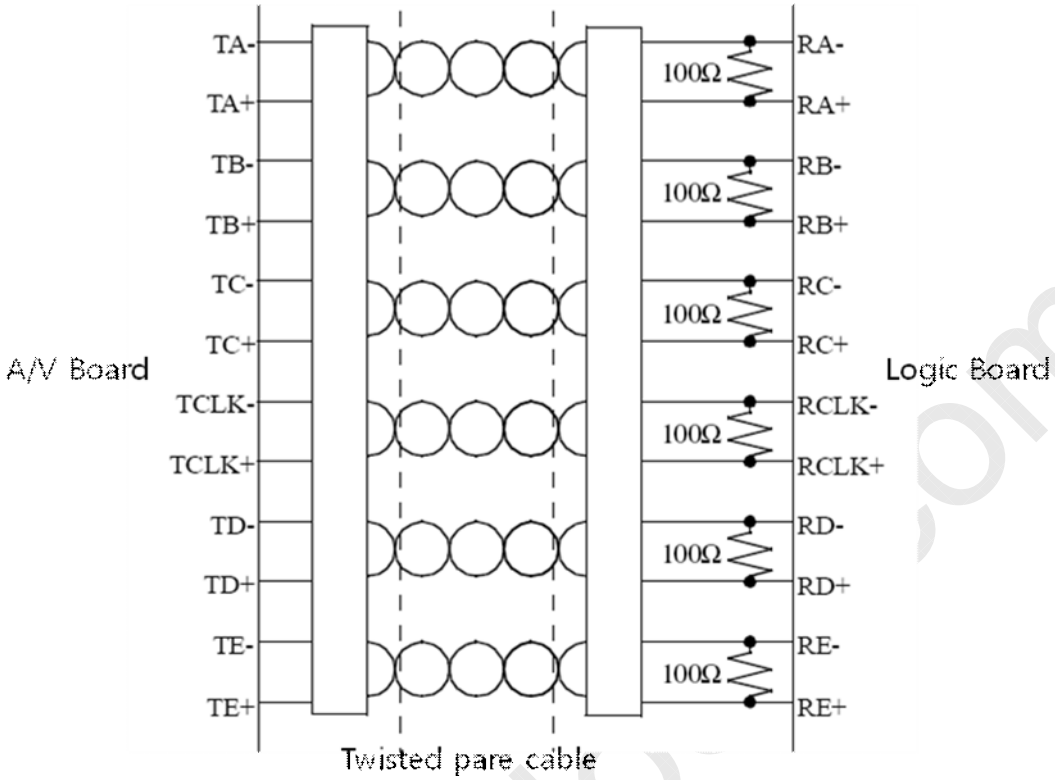
Product Specification of 50HD-PDP Module

□ LVDS Connection



Symbol	Function and description
RA+	Channel-A Pos. Receiver Input
RA-	Channel-A Neg. Receiver Input
RB+	Channel-B Pos. Receiver Input
RB-	Channel-B Neg. Receiver Input
RC+	Channel-C Pos. Receiver Input
RC-	Channel-C Neg. Receiver Input
RD+	Channel-D Pos. Receiver Input
RD-	Channel-D Neg. Receiver Input
RE+	Channel-E Pos. Receiver Input
RE-	Channel-E Neg. Receiver Input
RCLK+	Clock Pos. Receiver Input
RCLK-	Clock Neg. Receiver Input

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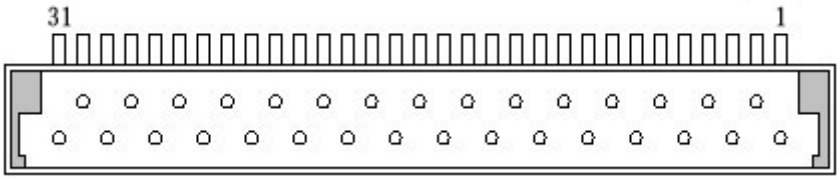
Product Specification of 50HD-PDP Module



Part_ Number : 1001-65231 (C_NET)

Pin. No	Symbol	Pin. No	Symbol
1	G	17	NC
2	G	18	NC
3	RA-	19	RD-
4	RA+	20	RD+
5	G	21	G
6	G	22	I2C_Ready
7	RB-	23	RE-
8	RB+	24	RE+
9	RF-	25	NLNP
10	RF+	26	G
11	RC-	27	Sclk
12	RC+	28	G
13	G	29	Sdata
14	G	30	G
15	Rclk-	31	NC
16	Rclk+		

※ RF-/+ is 12bit DATA (not used no connect)

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○ LVDS Receiver 8bit

Symbol	Signal Definition and Function	LSB ~ MSB						
		0	1	2	3	4	5	6
RA+/-	Channel-A. Receiver Input	RE0	RE1	RE2	RE3	RE4	RE5	GE0
RB+/-	Channel-B. Receiver Input	GE1	GE2	GE3	GE4	GE5	BE0	BE1
RC+/-	Channel-C. Receiver Input	BE2	BE3	BE4	BE5	HS	VS	DE
RD+/-	Channel-D. Receiver Input	RE6	RE7	GE6	GE7	BE6	BE7	
RE+/-	Channel-E. Receiver Input							
RF+/-	Channel-F. Receiver Input							
RCLK+/-	Clock. Receiver Input	DCLK						

○ LVDS Receiver 10bit

Symbol	Signal Definition and Function	LSB ~ MSB						
		0	1	2	3	4	5	6
RA+/-	Channel-A. Receiver Input	RE2	RE3	RE4	RE5	RE6	RE7	GE2
RB+/-	Channel-B. Receiver Input	GE3	GE4	GE5	GE6	GE7	BE2	BE3
RC+/-	Channel-C. Receiver Input	BE4	BE5	BE6	BE7	HS	VS	DE
RD+/-	Channel-D. Receiver Input	RE8	RE9	GE8	GE9	BE8	BE9	
RE+/-	Channel-E. Receiver Input	RE0	RE1	GE0	GE1	BE0	BE1	
RF+/-	Channel-F. Receiver Input							
RCLK+/-	Clock. Receiver Input	DCLK						

NOTE)

RE0~RE9 : 10 bit Red Pixel Video Signal (RE0:LSB, RE10:MSB)

GE0~GE9 : 10 bit Green Pixel Video Signal (GE0:LSB, GE10:MSB)

BE0~BE9 : 10 bit Blue Pixel Video Signal (BE0:LSB, BE10:MSB)

VS : Vertical Video Sync

HS : Horizontal Video Sync

DE : Video Data Enable

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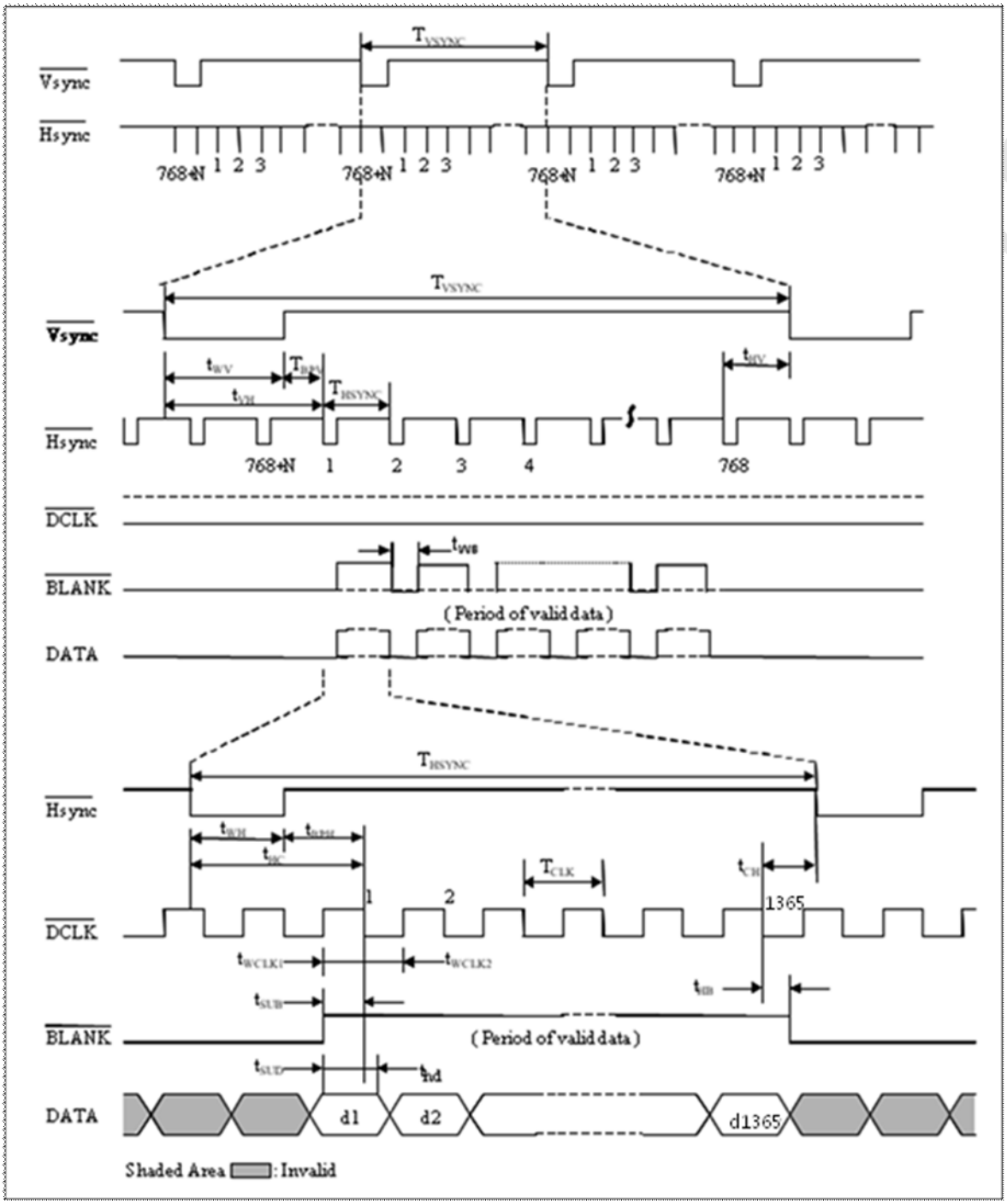
□ Input Signal Timing (Non-interlaced Mode)



Min & max of each signal are measured values when other signal is Typ.

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○ Input signal 60Hz specification

60Hz							
Parameter	**Symbol**		**Min.**	**Typ.**	**Max.**	**Unit**	**Note**
DCLK	Period	Tclk	14.3	13.5	12.8	ns	
	Frequency	-	71	74	77	MHz	
Hsync	Period	Thp	1451	1504	1520	Tclk	
	Width	Twh	6	10	12	Tclk	
Vsync	Period	Tvp	810	820	830	Thp	
	Width	Twv	2	6	10	Thp	
Data Enable	Horizontal Valid	T hv	1365	1365	1365	Tclk	
	Horizontal Back Porch	T hbp	56	76	86	Tclk	
	Vertical Valid	Tvp	768	768	768	Thp	
	Vertical Back Porch	Tvbp	20	30	35	Thp	

○ Input signal 50Hz specification

50Hz							
Parameter	**Symbol**		**Min.**	**Typ.**	**Max.**	**Unit**	**Note**
DCLK	Period	Tclk	14.3	13.5	12.8	ns	
	Frequency	-	71	74	77	MHz	
Hsync	Period	Thp	1451	1504	1520	Tclk	
	Width	Twh	6	10	12	Tclk	
Vsync	Period	Tvp	976	984	993	Thp	
	Width	Twv	2	6	10	Thp	
Data Enable	Horizontal Valid	T hv	1365	1365	1365	Tclk	
	Horizontal Back Porch	T hbp	56	76	86	Tclk	
	Vertical Valid	Tvp	768	768	768	Thp	
	Vertical Back Porch	Tvbp	20	30	35	Thp	

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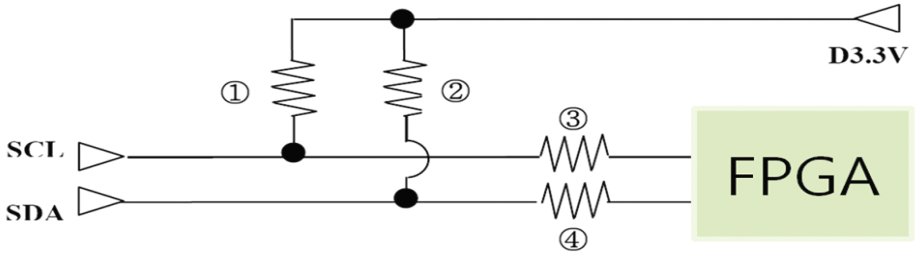
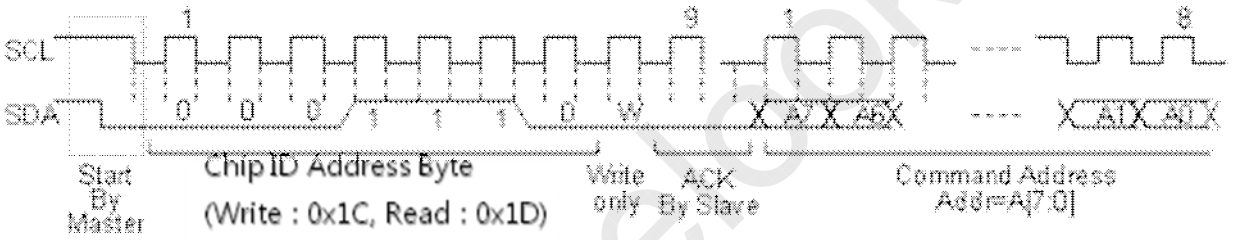
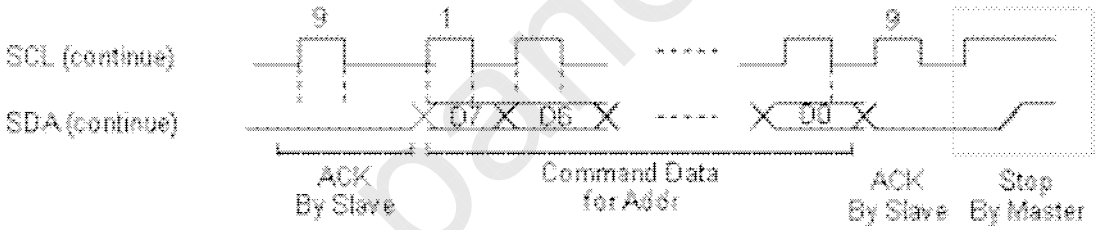
□ I2C Timing Specification & Register Description

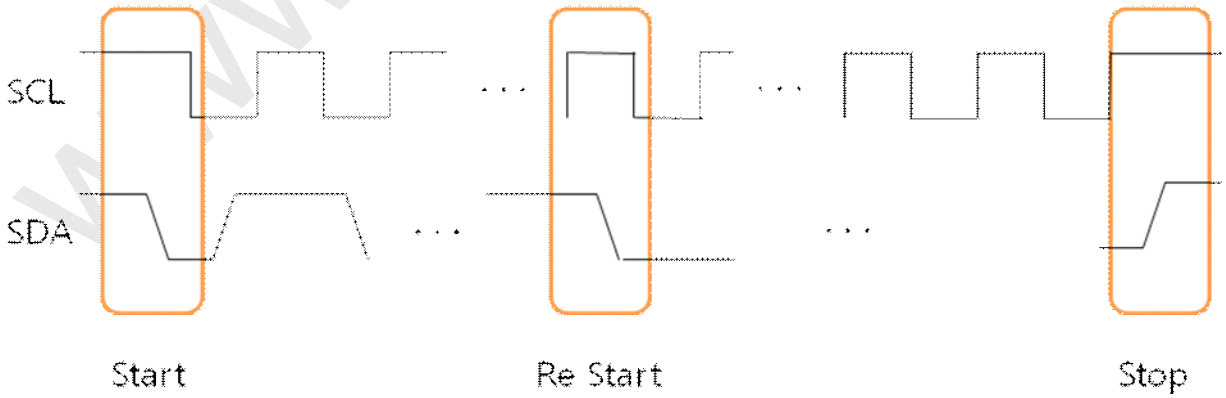


	①	②	③	④
Resistance, Ω	33K	33K	47	47

○ I2C Start, Restart and Stop condition







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Product Specification of 50HD-PDP Module

PARAMETER	SYMBOL	STANDARD-MODE		FAST-MODE		UNIT
		MIN.	MAX.	MIN.	MAX.	
SCL clock frequency	f_{SCL}	0	100	0	400	kHz
Hold time (repeated) START condition. After this period, the first clock pulse is generated	$t_{HD;STA}$	4.0	–	0.6	–	µs
LOW period of the SCL clock	t_{LOW}	4.7	–	1.3	–	µs
HIGH period of the SCL clock	t_{HIGH}	4.0	–	0.6	–	µs
Set-up time for a repeated START condition	$t_{SU;STA}$	4.7	–	0.6	–	µs
Data hold time: for CBUS compatible masters (see NOTE, Section 10.1.3) for I^2C-bus devices	$t_{HD;DAT}$	 5.0 0(2)	 – 3.45(3)	 – 0(2)	 – 0.9(3)	 µs µs
Data set-up time	$t_{SU;DAT}$	250	–	100(4)	–	ns
Rise time of both SDA and SCL signals	t_r	–	1000	$20 + 0.1C_b$(5)	300	ns
Fall time of both SDA and SCL signals	t_f	–	300	$20 + 0.1C_b$(5)	300	ns
Set-up time for STOP condition	$t_{SU;STO}$	4.0	–	0.6	–	µs
Bus free time between a STOP and START condition	t_{BUF}	4.7	–	1.3	–	µs
Capacitive load for each bus line	C_b	–	400	–	400	pF
Noise margin at the LOW level for each connected device (including hysteresis)	V_{nL}	$0.1V_{DD}$	–	$0.1V_{DD}$	–	V
Noise margin at the HIGH level for each connected device (including hysteresis)	V_{nH}	$0.2V_{DD}$	–	$0.2V_{DD}$	–	V

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○ Register Description

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
01h	SYNC_MODE	3bit	N	N	N	N	N	TBD	AUTO	MANUAL
08h	BRIGHT_MODE	4bit	N	N	N	N	PAL (1:0)		NT (1:0)	
09h	POWER_SAVE_MODE1	6bit	N	N	PAL (2:0)			NT (2:0)		
0Ah	POWER_SAVE_MODE2	TBD	N	N	N	N	N	N	N	N
0Bh	GAMMA_MODE	4bit	N	N	N	N	PAL (1:0)		NT (1:0)	
10h	COLOR_INVERSION	1bit	N	N	N	N	N	N	N	ON/OFF
11h	SCROLL	3bit	N	N	N	N	N	ON/OFF	MODE (1:0)	
18h	ISM_MODE	1bit	N	N	N	N	N	N	N	ON/OFF
20h	PGR	3bit	N	N	N	N	N	ON/OFF	SEL (1:0)	
21h	CHIP_INFO_YEAR	8bit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
22h	CHIP_INFO_WEEK	8bit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
23h	ERROR_CHECK_3	8bit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
24h	ERROR_CHECK_2	8bit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
25h	ERROR_CHECK_1	8bit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
26h	ERROR_CHECK_0	8bit	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

○ Sync MODE

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
01h	SYNC_MODE	3bit	N	N	N	N	N	TBD	AUTO	MANUAL

- ▶ Chip_id: PDP chip Version (TBD)
- ▶ Sync_auto: Sync automatic/manual mode selection (1 : Auto, 0 : Manual)
- ▶ Sync_Manual: Frequency selection manual mode
- ▶ Default setting: Automatic

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○ Gamma MODE

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
0Bh	GAMMA_MODE	4bit	N	N	N	N	PAL (1:0)		NT (1:0)	

▶ PAL(1:0) : 50Hz gamma mode

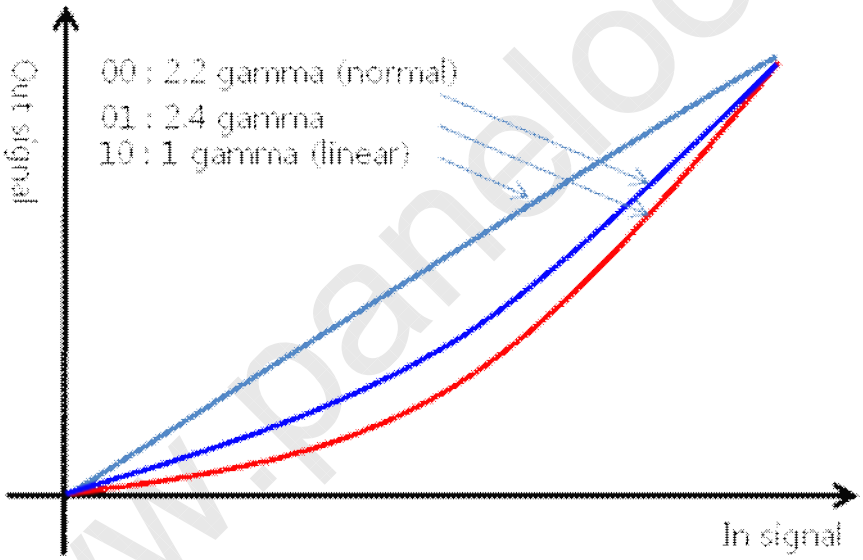
▶ NT(1:0) : 60Hz gamma mode

▶ "00" : 2.2 gamma mode, Default Value

▶ "01" : 2.4 gamma mode (not used)

▶ "10" : 1 gamma mode

▶ "11" : TBD



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○ Bright MODE

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
08h	BRIGHT_MODE	4bit	N	N	N	N	PAL (1:0)		NT (1:0)	

▶ PAL(1:0) : 50Hz bright mode

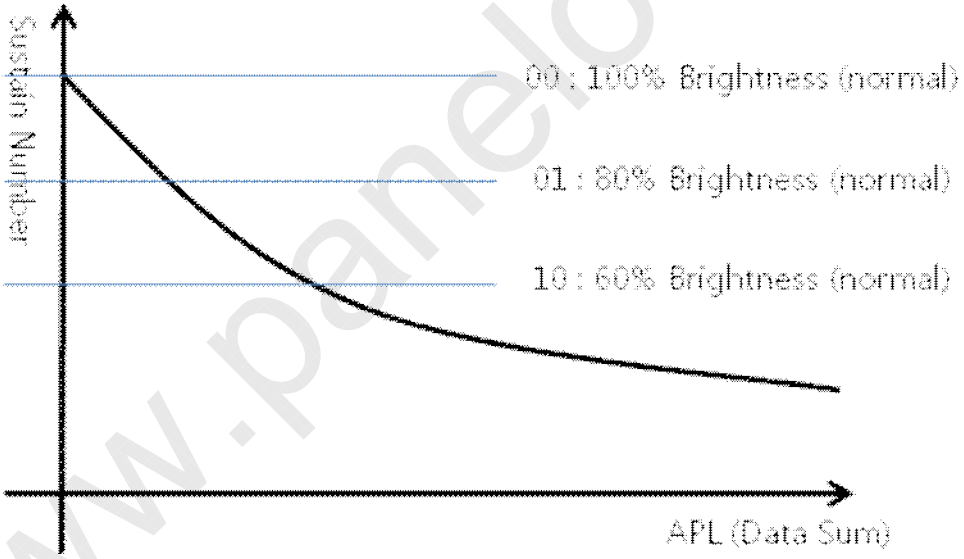
▶ NT(1:0) : 60Hz bright mode

▶ "00" : 100% brightness mode(Default Value)

▶ "01" : 80% brightness mode

▶ "10" : 60% brightness mode

▶ "11" : TBD



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○ Power Save MODE

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
09h	POWER_SAVE_MODE1	6bit	N	N	PAL (2:0)			NT (2:0)		

▶ PAL(2:0) : 50Hz Power save mode , Default Value “000”

▶ NT(2:0) : 60Hz Power save mode , Default Value “000”

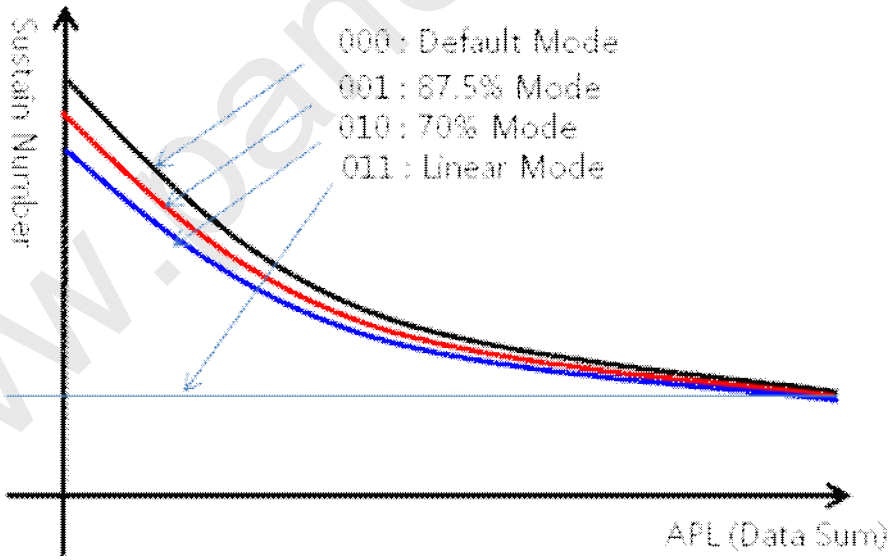
▶ “000” : Normal mode 100%

▶ “001” : 87.5% Power save mode

▶ “010” : 70% Power save mode

▶ “011” ~ “111” :TBD

▶ The Power save mode is that a variable sustain number control average power level



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○ Color Inversion MODE

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
10h	COLOR_INVERSION	1bit	N	N	N	N	N	N	N	ON/OFF

▶ Image inversion enable

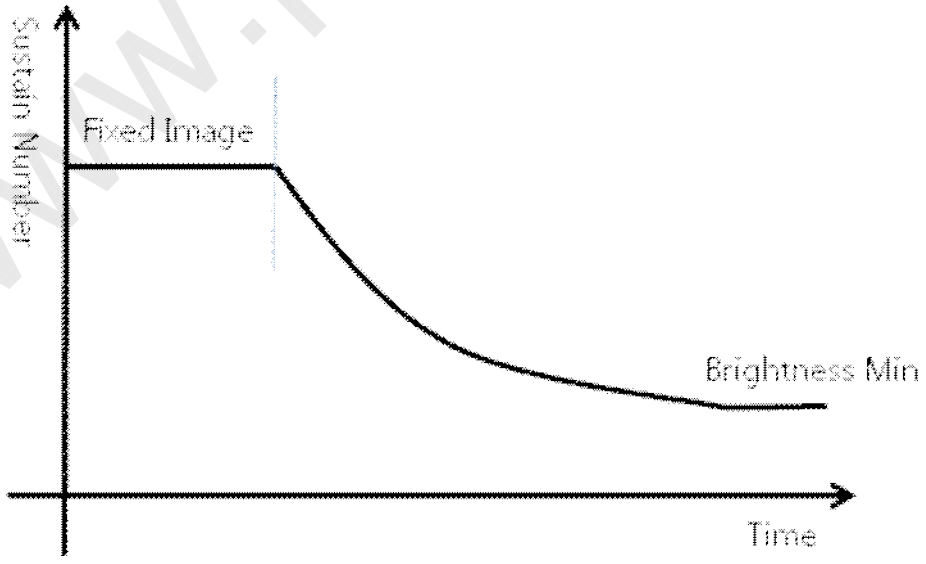
▶ "0" : Image inversion off, Default Value

▶ "1" : Image inversion on

○ IRR (Image Retention Reduction) MODE

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
18h	IRR_MODE	1bit	N	N	N	N	N	N	N	ON/OFF

This module has been equipped with a special method that minimizes the image retention phenomenon. When in the fixed pattern display mode decreases the brightness over a period of 5 sec with small steps. The figure below shows that the decrease in brightness is so small the user will not notice.



▶ The Brightness level decreases 1 step per 3sec to Brightness min level.

▶ "1": Image Retention Reduction on, Default Value.

▶ "0": Image Retention Reduction off.

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○ Internal Pattern Generation

I2C address	Mode	Bit	I2C data							
			7	6	5	4	3	2	1	0
20h	PGR	3bit	N	N	N	N	N	ON/OFF	SEL (1:0)	

▶ Pattern generation is automatically.

▶ ON/OFF: “0” => OFF, “1” => ON Default Value “0”

▶ SEL(1:0): Pattern Select

▶ “01”: rotation stop

▶ “10”: color bar

▶ “00”: H character

▶ “11”: rotation pattern

1.F_W → 2.F_R → 3.F_G → 4.F_B →

5.Horigental 256 gray_White →

6.Horigental 256 gray_Red →

7.Horigental 256 gray_Green →

8.Horigental 256 gray_Blue →

9.Vertical 256 gray_White →

10.Vertical 256 gray_Red →

11.Vertical 256 gray_Green →

12.Vertical 256 gray_Blue →

13.Diagonal 256 gray_White →

14. Diagonal 256 gray_Red →

15. Diagonal 256 gray_Green →

16. Diagonal 256 gray_Blue → 1.Full_White

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3. ELECTRO OPTICAL SPECIFICATIONS

□ Electro Optical characteristic Specifications (60Hz)

ITEM			Symbol	Condition ☞1)	Min.	Typ.	Max.	Unit
Peak White Brightness*			B_{WP}	1% white window	1500	1800	-	cd/m² ☞2)
Average White Brightness*			B_W	Full White	170	190	-	cd/m²
Brightness Uniformity			B_U		-10	0	+10	%
Color Coordinate	White	X	X_W		0.280	0.295	0.310	
		Y	Y_W		0.285	0.300	0.315	
Color Coordinate Uniformity			C_U		-0.01	0	-0.01	
Contrast Ratio*	Bright Room		CR_{BR}	100Lx at center	140:1	180:1	-	Contrast Ratio*
	Dark Room ☞3)		CR_{DR}	1% white window	8,000:1	10,000:1	-	
Power Consumption ☞4)			P_W	Full White	-	360	400	W
Tsync Margin			Hz			+/-1.5		Hz

□ Electro Optical characteristic Specifications (50Hz)

ITEM			Symbol	Condition ☞1)	Min.	Typ.	Max.	Unit
Peak White Brightness*			B_{WP}	1% white window	1300	1500	-	cd/m² ☞2)
Average White Brightness*			B_W	Full White	170	190	-	cd/m²
Brightness Uniformity			B_U		-10	0	+10	%
Color Coordinate	White	X	X_W		0.280	0.295	0.310	White
		Y	Y_W		0.285	0.300	0.315	
Color Coordinate Uniformity			C_U		-0.01	0	-0.01	0
Contrast Ratio*	Bright Room		CR_{BR}	100Lx at center	130:1	170:1	-	Contrast Ratio*
	Dark Room ☞3)		CR_{DR}	1% white window	8,000:1	10,000:1	-	
Power Consumption ☞4)			P_W	Full White	-	360	400	W
Tsync Margin			Hz			+0.7/-1.3		Hz

☞*) Module brightness can be lowed up to 25% comparing with room temperature when panel temperature is below than 18℃.
☞1) All characteristics are measured in the room temperature.
☞2) The brightness of the white peak position is measured while the 1%-window pattern is “ON” state. And then, it should be checked in 10 seconds after 1%-window is “ON” state.
- Occasionally, the dark position could be changed to any other point arbitrary.
☞3) The brightness of dark room is less than 1 lux.
☞4) Total Power Consumption can be up to 450W according to the displayed pattern.

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4.MECHANICAL AND ENVIRONMENTAL SPECIFICATIONS

□ Mechanical Characteristic Specifications

Item		Spec.	Unit	Remark
Outline Dimensions		1180.0(H)*678.3(V)*60.8±1	mm	See" Outline Drawing"
Display Area		1105.6(H)*622.0(V)*±0.5	mm	
Weight	Net	18.2±0.5	Kg	
	Gross	268.0±5(10EA/1BOX)	Kg	

□ Vibration, shock and Drop Specifications

Item	Condition	Remark
Vibration	▶X,Y direction 1.04G, Z direction, 0.73G, 2~200Hz (Sweep time : 30 Min)	▶ Non operation ▶ 10ea Packed state
Shock	▶X,Y direction 20G, Z direction 15G, duration time 20ms	
Drop	▶Bottom : Free Falling : 20 cm	

□ Environmental Conditions

1) Operation Condition

Item	Recommended	Absolute maximum
Ambient Temperature	5℃~45℃	0℃~50℃
Humidity	20~70% RH	20~80% RH
Panel surface temperature	Absolute maximum temperature : 120℃ (ΔT ≤ 20℃/㎝)	

Note : 1. this module can be operated normally at lower altitude than 2000m(625Torr)
2. In case that a module is left out at the low temperature for a long time(more than 1 hour), It has be operated after for at least 15 minutes.

2) Storage Conditions

Item	Recommended	Absolute maximum
Ambient Temperature	-5℃~45℃	-20℃~70℃
Humidity	20~80% RH	5~85% RH
Air Pressure	633Torr~760Torr (0~1,500m)	229Torr~760Torr (0~10,000m)

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5. Image Sticking Characteristics

□ **Image Sticking**

The fluorescent substance used in the plasma module loses its brightness with the lapse of lighting time. This deterioration in brightness appears to be a difference in brightness in relation to the surroundings, and comes to be recognized as image sticking.
In other words, the image sticking is defined as follows: when the same pattern (of the fixed display) is displayed for a long time, a difference in brightness is caused around the lighting area and non-lighting area due to deterioration in the fluorescent substance.
When the present pattern is changed over to another one, the boundary comes to be seen between the lighting area and non-lighting area due to difference in brightness in the pattern shown shortly before changeover.
If this conditions is accumulated, the boundary or image sticking comes to be seen with the naked eyes.

□ **Warranty**

Image sticking and faults in brightness and picture elements are excluded from the warranty objects.

Proposed measures taken to relieve image sticking

So long as there is the reduction of brightness in the fluorescent substance, it is impossible to avoid the occurrence of image sticking. Therefore, to relieve image sticking, we offer you a method of entering an image input that may ensure reluctance to the generation of the difference in brightness reduction among the displayed dots.
The images from TV broadcasting involve a high rate of motion picture displays.
Therefore, there is less chance of being a cause of difference in brightness reduction among the cells.
Even when the fixed patterns are displayed, they generally last for a few minutes.
Since the same pattern is less liable to be displayed, there is almost no influence toward image sticking.
If the fixed patterns tend to be displayed for a long time, however,
there occurs a substantial imbalance between the lighting and non-lighting areas,
thus causing a difference in brightness as a result. In this document,
we offer you some proposals of installation, paying attentions to the two points: the reduction of difference in brightness achieved by integrated lighting time leveling and the method of edge smearing to make image sticking hard to be discerned.
The result from these proposals can, however, greatly depend on the contents of images and the operating environment.
Therefore, we consider that it is essential to take the suitable measures in consideration of the customer's operating environment.

Example of Proposal 1: The display position is moved while the fixed display pattern is changed over, or it is scrolled during the display.
Example of Proposal 2: If possible, a pattern of complementary color is incorporated (for integrated time leveling).
Example of Proposal 3: The fixed pattern and the motion picture display are reciprocally exchanged, in order to minimize display period of the fixed pattern.
Example of Proposal 4: During operation, the brightness of screen is suppressed as low as possible.

For the display patterns, characters are indicated not on the black ground (non-picture area) but on the colored ground (mixture of R, G, B recommended).

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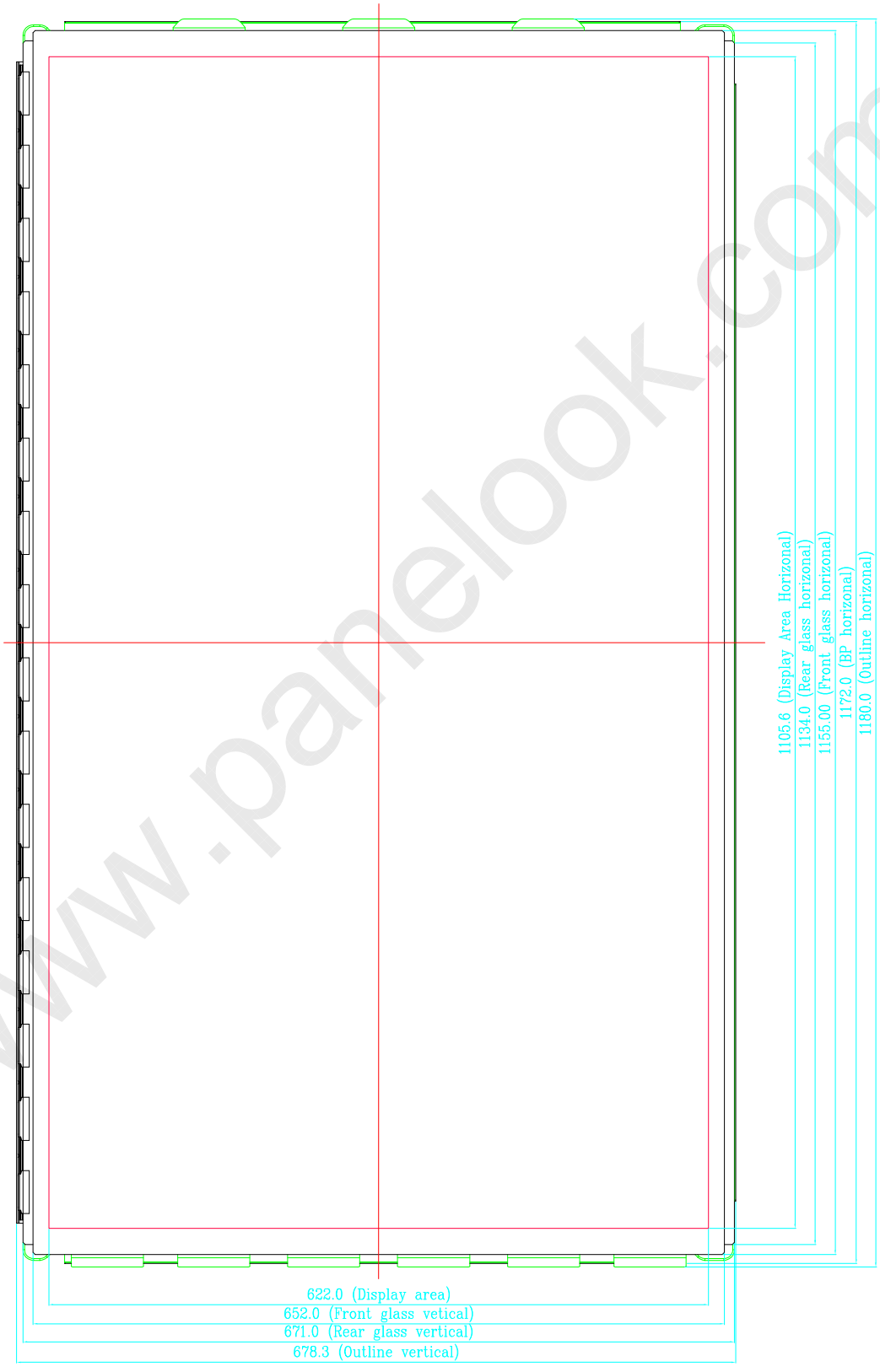
6.OUTLINE DRAWING

□ Front View



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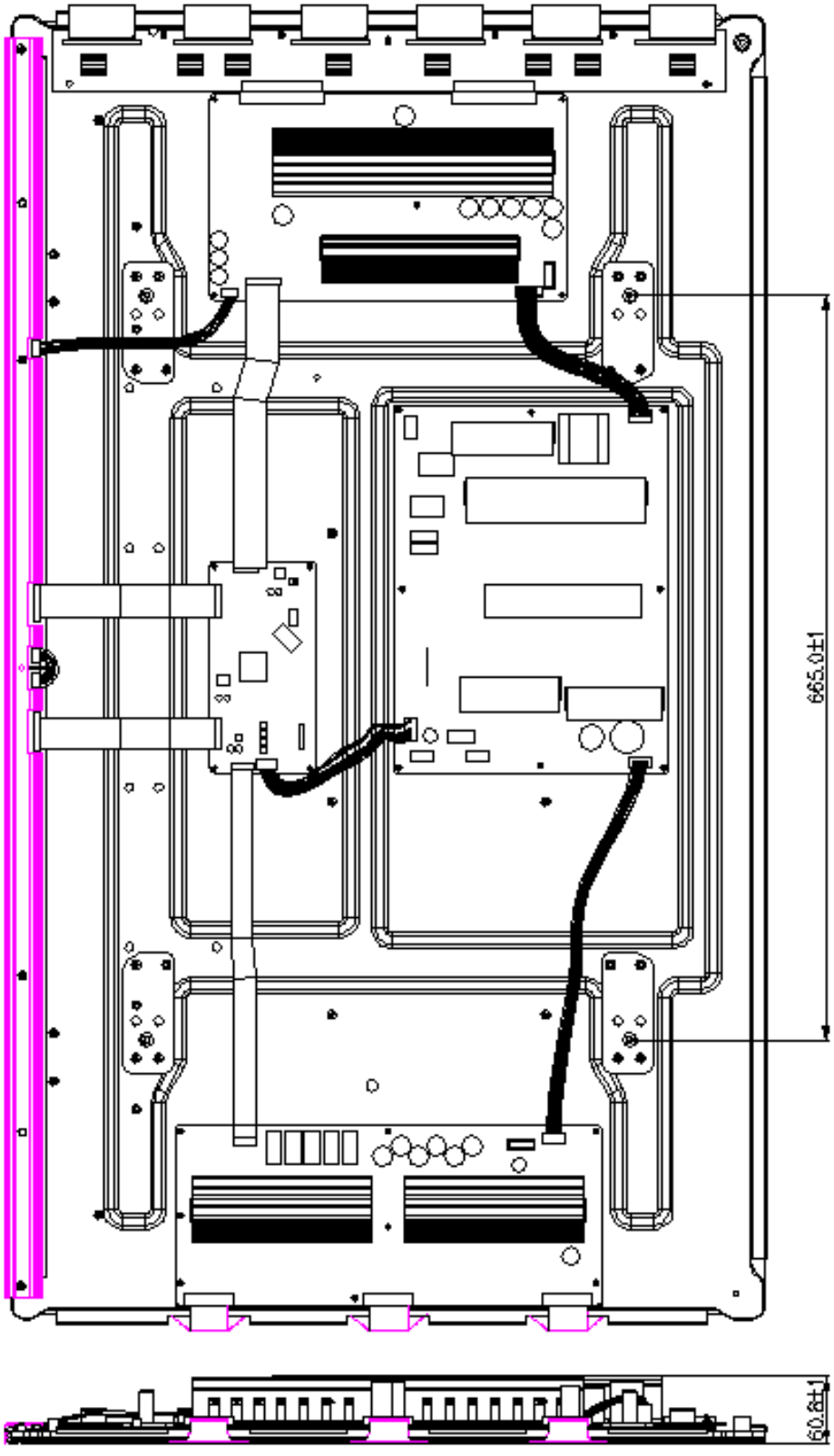
Product Specification of 50HD-PDP Module

☐ Rear View



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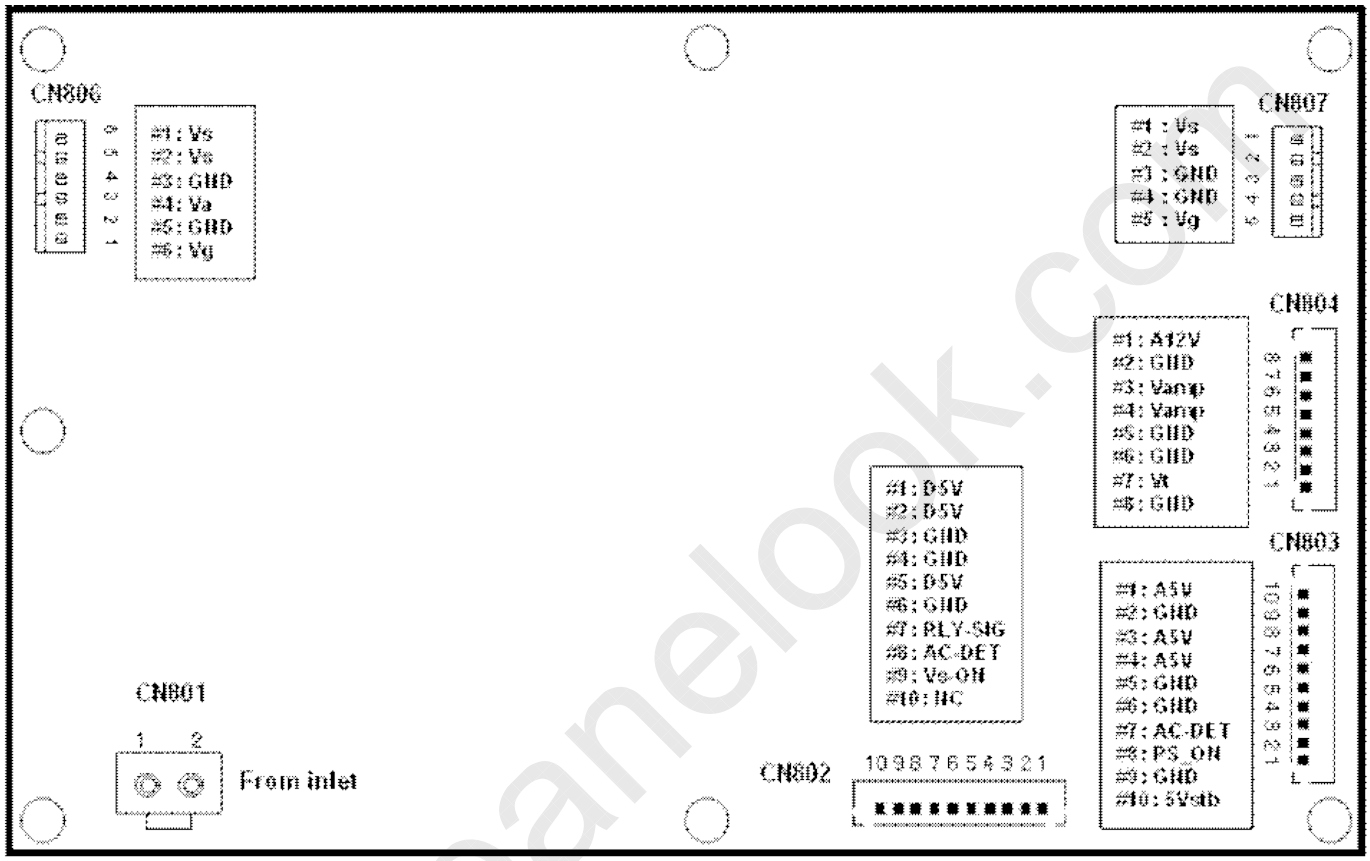
7. Connector and Connections



Location No.	Specification	Vendor
CN801	YW396-03V	Yeon Ho
CN802	TJC3-10A (Equivalent)	HUATE
CN803	TJC3-10A(Equivalent)	HUATE
CN804	TJC3-8A(Equivalent)	HUATE
CN805	YW396-05V	Yeon Ho
CN807	YW396-05VO	Yeon Ho

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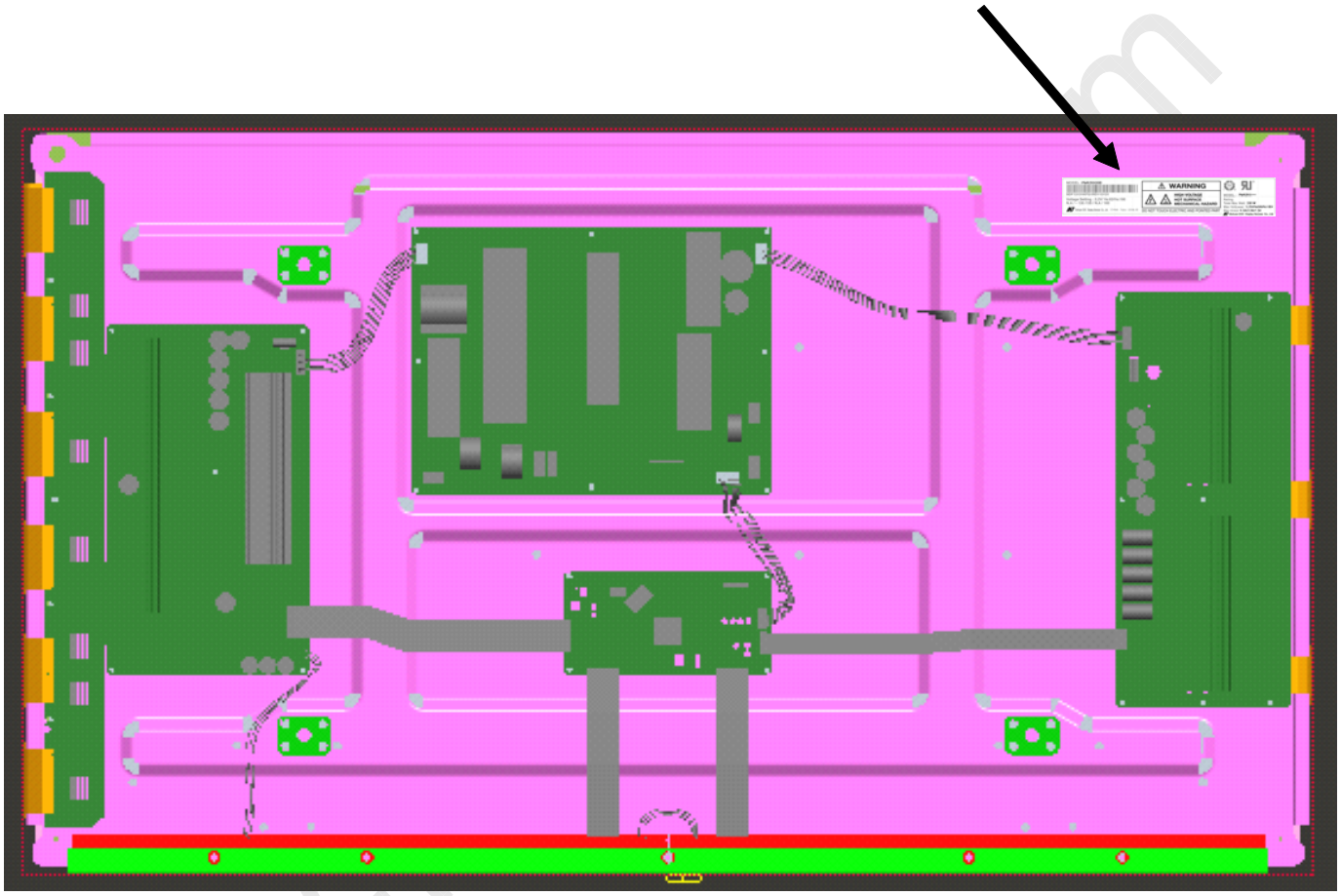
8.LABEL

□ LABEL Sticking Position : Product Label (150*27 mm)



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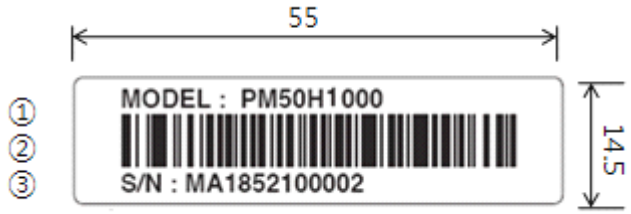
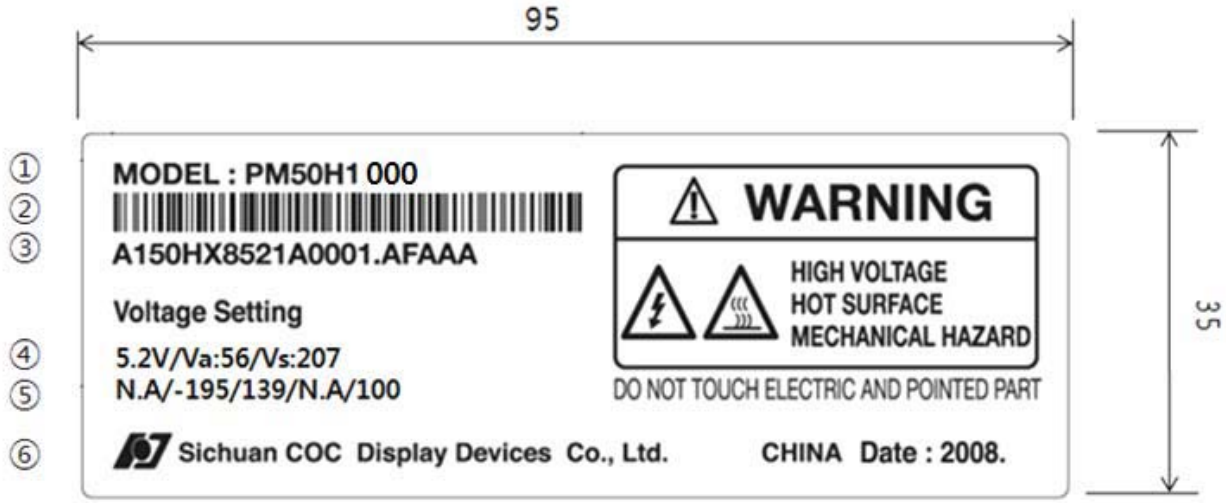
☐ LABEL

1) LABEL-1 ; Identification Label



① Model Name
② Bar Code (Code 128, Contains the manufacture No.)
③ Serial Number

2) LABEL-2 ; Voltage and Warning Label



① Model Name
② Bar Code
③ Manufacture No.
④ Adjusting voltage : (DC, Va, Vs)
⑤ Adjusting voltage : (Setup/-Vy/Vsc/Ve/Vzb)
⑥ The Trade Name of COC Display Devices.

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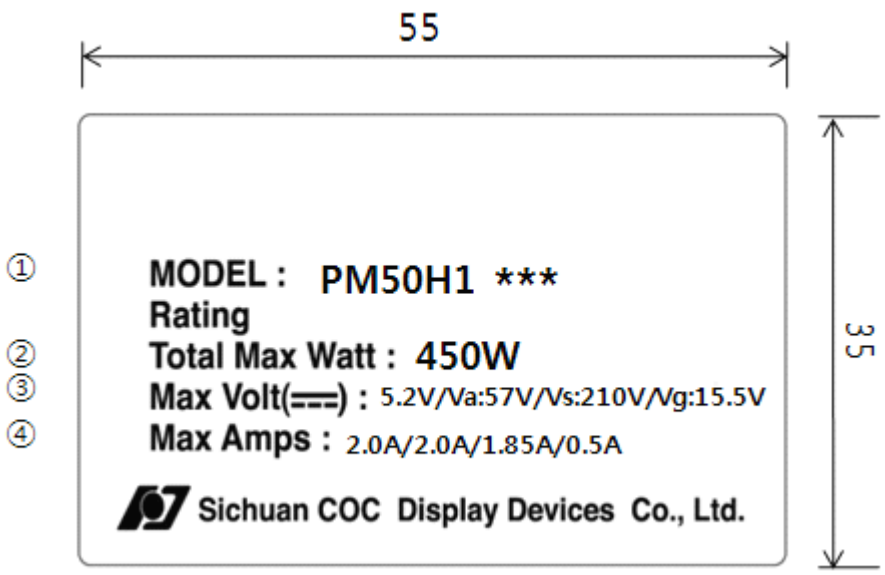
3) LABEL-3 ; Safety approval Label



① Model Name
② Max Watt.
③ Max Volts.
④ Max Amps

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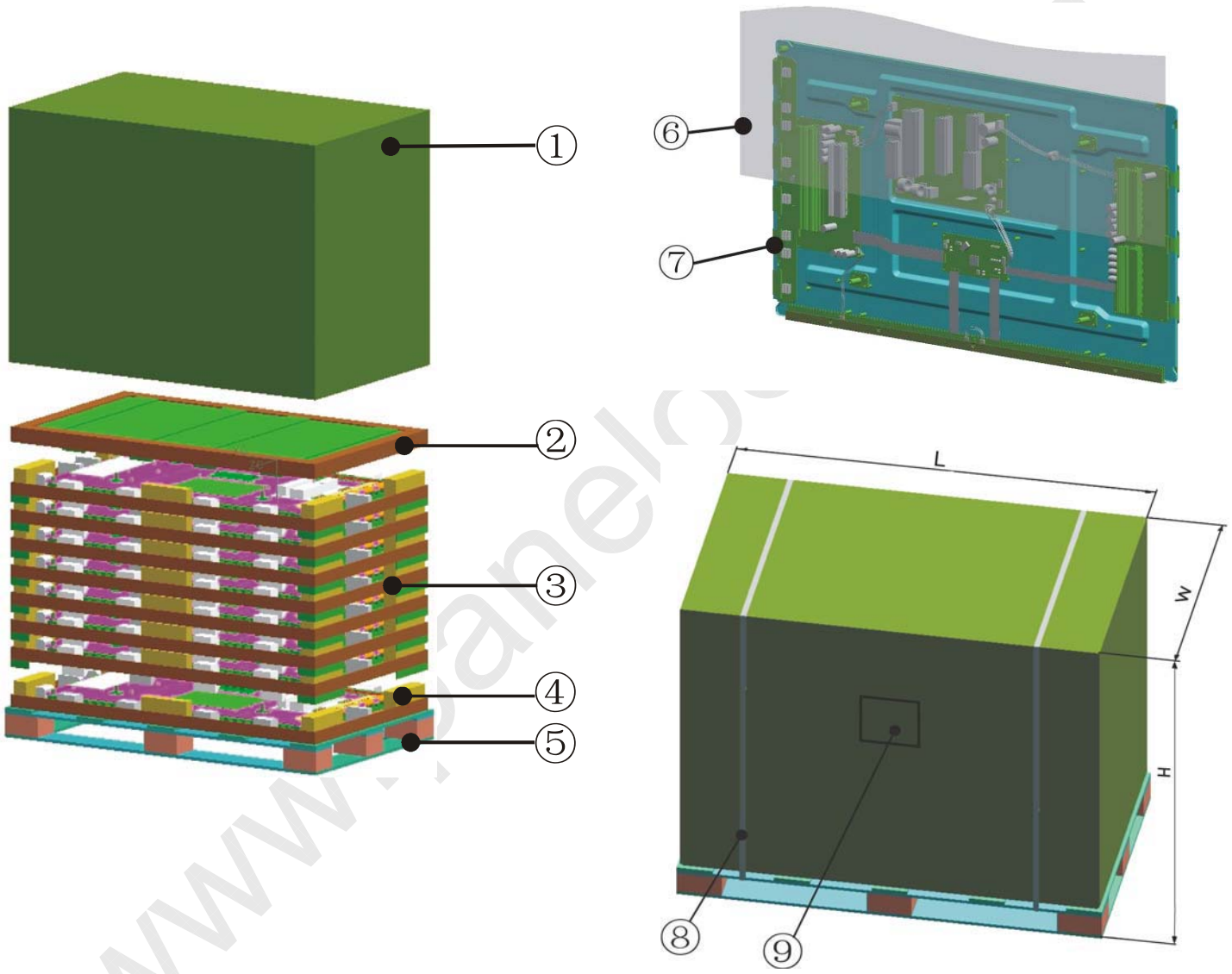
9.PACKING

□ Box Packing (8 module per each box) – A short distance movement.
□ Packing dimensions (L*W*H) : 1420 x 840 x 1050 mm）(Including Pallet）
□ Weight : About 221±5 Kg
□ Packing Assembly



NO.	Item	NO.	Item
1	PACKING BOX	6	PACKING VYNYL
2	PACKING PAD-TOP	7	PDP MODULE
3	PACKING PAD-MIDDLE	8	PP-BAND
4	PACKING PAD-DOWN	9	LABEL-INSPECTION
5	PALLET		

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APPENDIX

□ Cell Defect Specifications

Defect	Specification		
	Number of Cell Defects (N)		Distance between two defects (D)
Non-lighting Cell ☞1)	A-zone	▶ 3 and less	▶ Regardless of A and B Zone. Maximum 1 cell Defect in an area of 50*50 mm is Allowed.
	B-zone	▶ 10 and less	
Non-extinguishing Cell ☞2)	A-zone	▶ 1	
	B-zone	▶ 2 and less	
Flickering Cell☞3) (the W/R/G/B screen)	A-zone	▶ 2	
	B-zone	▶ 3 and less	
Flickering Cell☞3) (the other screen)	A-zone	▶ 1	
	B-zone	▶ 2 and less	
High Intensity Cell ☞4)	A-zone	▶ 1	
	B-zone	▶ 2 and less	
Continuous Cell	A-zone	▶ 1 and less	
	B-zone	▶ 1 and less	
▶ Total sum of all defects N ≤ 14 and less			
Stain ☞5)	▶ N ≤ 6, for the stain of which longer-axis length is 5mm or shorter. ▶ N = 0, for the stain of which longer-axis length is longer than 5mm.		▶ D > 50mm

☞1) Non-Lighting Cell is defined as “A cell which is always off”
☞2) Non-extinguishing Cell is defined as “A cell which is always on”
☞3) Flickering Cell is defined as “A cell which is flickering”
☞4) High Intensity Cell is defined as “A cell which is brighter than a correct cell”
☞5) Stain is defined as “A blob due to local color contamination in white or simple color pattern”

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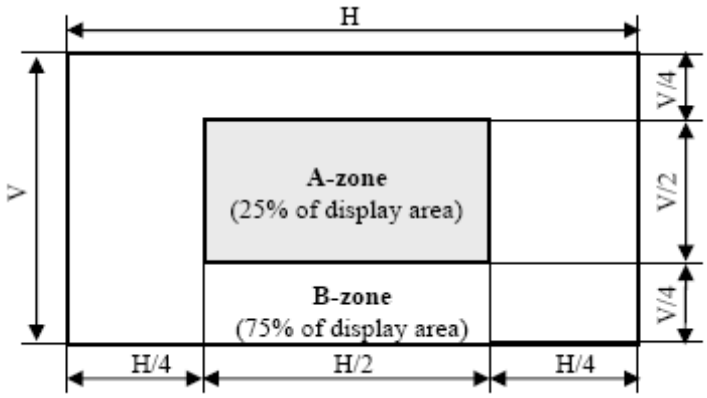

□ Scratch and Dent Specification

Item	Spec	Unit	Remark
Scratch	W ≤ 0.01 : ignored 0.01≤W≤0.09, 0.3≤L≤25.4, N≤1 0.1≤W≤0.14, L≤12.7, N≤1 0.1≤W≤0.14, L≤12.7, N≤1	mm	W : Width L : Length D : Depth N : Number
Dent	D ≤ 0.75, N ≤ 6	mm	

□ Sound Pressure Level Specification

1) Level Ground (Land)
- Measuring Condition : 0m
- Sound Pressure Level is overall level calculated from the individual band levels of 250Hz ~ 8KHz.
- Spec : 31 dB Max

2) High Ground
- Measuring Condition : 1600 m
- Sound Pressure Level is overall level calculated from the individual band levels of 4KHz ~ 12.5KHz.
- Spec : 37 dB Max

[Note]

1) Audible noise is guaranteed till the altitude of 1,600 meter.

2) In order to guarantee audible noise at higher altitude 1,600 meter, a special module has to be used.

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*** Sound Pressure Level Measuring Condition**

(1) Environment : Anechoic chamber
(2) Background noise level : less than 20dBA
(3) Equipment : FFT Analyzer
  i. Type2827 made by B&K
  ii. PAK system v5.3 above made by MULLER-BBM
(4) Distance : 1.0m from the center of rear side of PDP

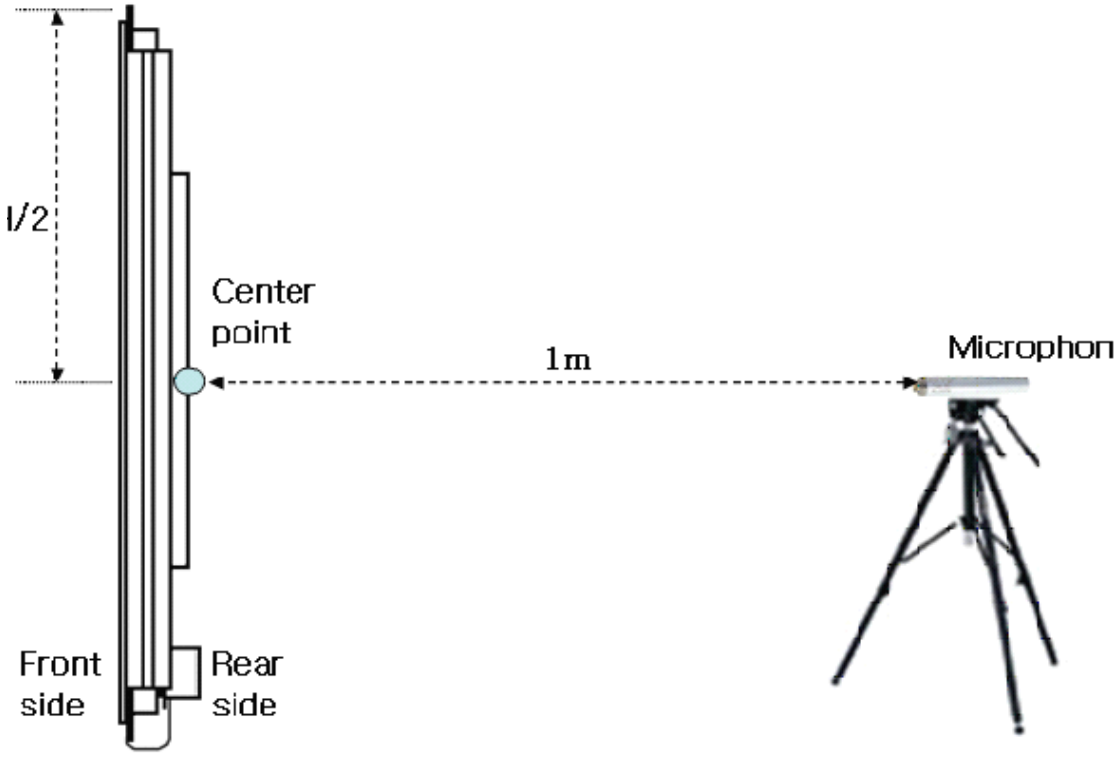

Figure 14 - Measuring layout

*** Sound Pressure Level Measurements**

(1) Pattern : Full white pattern
(2) Frequency Range : 250Hz ~ 8kHz
(3) Bandwidth : ⅓ Octave band
(4) Weighting : A-weighting
  Overall value is sum of Sound Pressure Level which is calculated from the indivisual band of 250Hz~8kHz.

$$SPL = 20\log_{10}\left(\frac{P}{P_0}\right)dBA$$

Where, $P_0 = 20\times10^{-6}\ pa$

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